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## PATENT ABSTRACTS OF JAPAN

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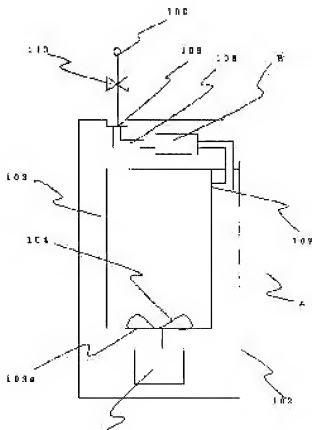
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(21)Application **2000-095813** (71) **TOTO LTD**  
 number : Applicant :  
 (22)Date of filing : **30.03.2000** (72)Inventor : **ANDO SHIGERU**  
**TAKESHITA AKEMI**

**(54) WASHING MACHINE****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To solve the problem with fiber products rendered antibacterial and mildew-proof, such as socks, underwear, sportswear, towels, toiletry, pajamas, bedding, care articles, dish towels and the like, that even if they initially have antibacterial effects, their antibacterial property is lost after several times of washing, so that they cannot stop the growth of bacteria and therefore become sweaty.

**SOLUTION:** The washing machine has a washing process carried out several times for washing clothes using wash water supplied at each of the several times of the washing process. The washing machine has a silver ion adding unit for adding silver ions to the wash water, the silver ions being supplied as the wash water at the final washing process (rinsing process).





JAPANESE

[JP,2001-276484,A]

Drawing selection

Representative draw

CLAIMS DETAILED DESCRIPTION TECHNICAL  
FIELD PRIOR ART EFFECT OF THE INVENTION  
TECHNICAL PROBLEM DESCRIPTION OF  
DRAWINGS DRAWINGS

[Translation done.]

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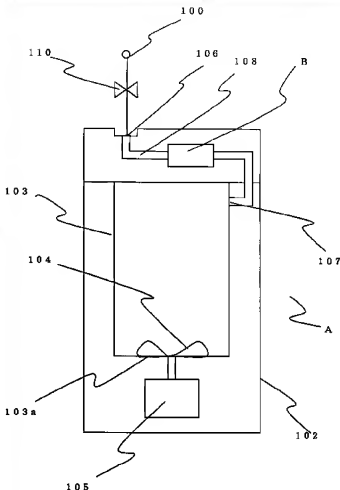
## CLAIMS

[Claim(s)]

[Claim 1]It is a washing machine which washes this clothing using wash water which has a washing process of multiple times in order to wash clothing, and is supplied for every time of a washing process of these multiple times, A washing machine, wherein it provides a silver ion addition unit which adds a silver ion to wash water and a silver ion is supplied as wash water by the last round of a washing process of multiple times.

[Claim 2]A cell with which said silver ion addition unit consists of a silver electrode, and the washing machine according to claim 1 consisting of a control section which carries out the power controls of the silver electrode.

[Claim 3]The washing machine according to claim 2 arranging said cell in the middle of a channel which flows tap water, impressing electric power to a cell in accordance with timing into which tap water flows, and generating silver ion water.



[Translation done.]

[Claim 4]The washing machine according to claim 3 cutting off water in a place which reached predetermined amount of water which completes electrolysis electric power in a place arrived at at electrolysis time set up beforehand, and is detected with a flow switch etc., and which was set up beforehand.

[Claim 5]Claims 1-4, wherein silver concentration of silver ion water used for said washing is not less than 3 ppb and 50 ppb or less are the washing machines of a statement either.

[Claim 6]Claims 1-5 which are the tap water which does not contain a silver ion after washing with silver ion water, and are characterized by rinsing and washing are the washing machines of a statement either.

[Claim 7]Claims 1-6 possessing a switch which selects whether a washing process in silver ion water is adopted are the washing machines of a statement either.

[Claim 8]Claims 1-7 arranging an indicator which indicates whether wash water in an inside of a washing machine is silver ion water, and indicating that it is silver ion water when wash water is silver ion water are the washing machines of a statement either.

[Claim 9]Claims 1-8 to which having washed with silver ion water when it has an indicator which indicates that it washed with silver ion water and washing by silver ion water was completed is characterized by what is displayed are the washing machines of a statement either.

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[Translation done.]

JAPANESE

[JP,2001-276484,A]

Drawing selection **Representative draw**

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**DETAILED DESCRIPTION**

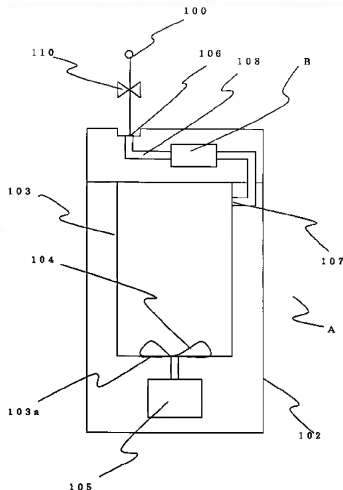
[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to clothing and the washing machine which sterilizes a washing machine tub using the silver ion water containing a silver ion.

[0002]

[Description of the Prior Art]Textiles, such as the socks which carried out antibacterial properties and mildewproofing processing, an underwear, sportswear, a towel, toiletries, pajamas, bedding, nursing care goods, and a dishcloth, are successively commercialized with the clean intention. Although what uses natural antimicrobial, such as chitosan and hinokitiol, the thing of an antibacterial effect which added copper, zinc, etc., etc. are various, after washing all, an effect falls. According to the voluntary standards which a textiles sanitary finishing conference establishes, even if it washes 10 times, it is a durable valuation basis whether it is effective.



[Translation done.]

[0003]

[Problem(s) to be Solved by the Invention] Since antibacterial properties are lost in several wash even if there is an antibacterial effect in early stages, it cannot control being unable to suppress growth of a bacillus, therefore becoming smelling of sweat. There is this invention in providing a means to solve said technical problem.

[0004]

[Means for Solving the Problem and its Function and Effect]

The invention according to claim 1 made in order to solve an aforementioned problem. It is a washing machine which washes this clothing using wash water which has a washing process of multiple times in a washing machine in order to wash clothing, and is supplied for every time of a washing process of multiple times. A silver ion addition unit which adds a silver ion to wash water is provided, and a silver ion is supplied as wash water by the last round (rinse process) of a washing process of multiple times.

[0005] When this invention person added a silver ion to tap water used by the last round (rinse process) of a washing process, a silver ion remained to a washing machine inner wall of tank, and was sterilized. Although the antibacterial properties of the conventional antimicrobial product in which an antimicrobial agent was scoured fell with use, if this invention is followed, the coat of the silver ion will be carried out to clothing, and the antibacterial treatment of them will be carried out to it. That is, an antibacterial treatment is carried out whenever it carries out clothing washing.

[0006] The invention according to claim 2 made in order to solve an aforementioned problem consists of a cell with which said silver ion addition unit consists of a silver electrode, and a control section to which the power controls of the silver electrode are carried out in the washing machine according to claim 1.

[0007] If this invention is followed, it is not necessary to change a channel and a silver ion can be added only by impressing electrolysis electric power to silver inter-electrode according to timing which wants to add silver to add a silver ion. By controlling electrolysis electric power between silver electrodes, since addition concentration of a silver ion is kept constant, antibacterial activity of high reliability is obtained.

[0008] In the washing machine according to claim 2, said cell is arranged in the middle of a channel which flows tap water, electric power is impressed to a cell in accordance with timing into which tap water flows, and the invention

according to claim 3 made in order to solve an aforementioned problem generates silver ion water.

[0009]Without wash water which washed and became dirty carrying out water-contacting [ of the clothing ], since a cell will be arranged in a channel of tap water if this invention is followed, an electrode surface does not become dirty but water of stable silver ion concentration is generated.

[0010]The invention according to claim 4 made in order to solve an aforementioned problem cuts off water in the washing machine according to claim 3 in a place which reached predetermined amount of water which completes electrolysis electric power in a place arrived at at electrolysis time set up beforehand, and is detected with a flow switch etc., and which was set up beforehand.

[0011]The day to day variation of the amount of water per unit time (the rate of flow) which flows into a washing machine is carried out, and it carries out the day to day variation of the time to reach predetermined amount of water required for washing. By the way, when this invention person inquired and electrolysis control of voltage and current was fixed, the rate of flow of tap water which flows through a cell hardly influenced a silver ion addition per unit time. That is, since a constant rate of the amounts of silver ions are added to amount of water which became constant [ an addition of a silver ion when only time set up beforehand is electrolyzed ], and was set up by a flow switch etc., silver ion concentration of generated wash water always serves as a fixed value.

[0012]the invention according to claim 5 made in order to solve an aforementioned problem -- either of claims 1-4 -- in a washing machine of a statement, it is characterized by silver concentration of silver ion water used for said washing being not less than 3 ppb and 50 ppb or less.

[0013]When this invention person inquired, the antibacterial properties of clothing and the washing machine inner wall of tank were carried out for silver ion concentration at not less than 3 ppb. When silver ion concentration was set to not less than 50 ppb, a tendency for a black discoloration thing of silver compound origin to adhere to clothing and a washing machine inner wall of tank was seen. Therefore, silver ion concentration was considered that not less than 3 ppb of \*\* and 50 ppb or less are desired.

[0014]In a washing machine of a statement, claims 1-5 are the tap water which does not contain a silver ion after washing with silver ion water either, and the invention according to claim 6 made in order to solve an aforementioned problem is rinsed, and is washed.

[0015]When this invention person is the tap water which does not contain silver ion water after washing, rinsed and washed with silver ion water, a tendency for a black discoloration thing of silver compound origin to adhere fell, and antibacterial properties were maintained.

[0016]The invention according to claim 7 made in order to solve an aforementioned problem possesses a switch which selects whether a washing process in silver ion water is adopted in any of claims 1-6, or a washing machine of a statement.

[0017]Allergy may be rarely shown to silver. In that case, it is necessary to prevent a silver ion from adhering to clothing etc. If this invention is followed, it will become possible to lose silver ion adhesion in clothing with the switch which selects cancellation of a washing process in silver ion water.

[0018]The invention according to claim 8 made in order to solve an aforementioned problem, either of claims 1-7 -- in a washing machine of a statement, an indicator which indicates whether wash water in an inside of a washing machine is silver ion water is arranged, and when wash water is silver ion water, it indicates that it is silver ion water

[0019]Allergy may be rarely shown to a silver ion. A seal exception does not attach visually whether wash water is silver ion water. If it has a means to indicate that it is silver ion water, it turns out visually that it is silver ion water.

[0020]the invention according to claim 9 made in order to solve an aforementioned problem -- either of claims 1-8 -- in a washing machine of a statement, if it has an indicator which indicates that it washed with silver ion water and washing by silver ion water is completed, it will indicate that it washed with silver ion water

[0021]Visually, it cannot be distinguished whether the antibacterial treatment was washed and carried out with silver ion water. If it indicates that it washed with silver ion water, having been washed with silver ion water will become possible [ checking visually ].

[0022]

[Embodiment of the Invention]Hereafter, this invention is explained based on the example of a graphic display.

Drawing 1 applies this invention to a swirl-type soaping machine. The wash container in which the upper part for wash in which the inside A of the said figure provides in a washing machine, 102 was provided in the case of the washing machine A, and 103 was provided in the case 102 carried out the opening, the solid of revolution for stirring by which 104 was provided in the hole 103a of the pars



basilaris ossis occipitalis of the wash container 103, and 105 are motors made to rotate the solid of revolution 104 for stirring. The filling port by which 106 was provided in the case 102, and 107 are water supply openings which fill the wash container 103 with the water from the filling port 106. The silver ion water generating device B is formed in the course 108 of the water between this filling port 106 and the water supply opening 107.

[0023]As shown in drawing 2, the silver ion water generating device B comprised the negative pole 121 and the anode 122, and is provided with the flow rate sensor 210 connected by the water flowing pipe 290a. The service pipe 290b prolonged from the flow rate sensor 210 is connected to the relief valve 110. The silver ion water generating device B is provided with the control unit 240 which has a DC power supply circuit with variable electric power containing the microcomputer programmed further to control a switching power supply circuit and this switching power supply circuit.

[0024]The operation of the washing machine A is shown below. As shown in drawing 1 and drawing 2, it is supplied from the cock 100, and the tap water extracted to the predetermined flow by the relief valve 110 flows into the silver ion water generating device B through the inlet 106 and the course 108 of water, and flows through the flow rate sensor 210 and the water flowing pipe 290a. A flow is detected by the flow rate sensor 210, and a flow rate signal is outputted to the control unit 240 from the flow rate sensor 210.

[0025]Electrolytic treatment is carried out by impressing the prescribed voltage and the electrolysis electric power of current which were controlled by the control unit 240 according to the flow of the tap water which flows through the water flowing pipe 290a detected by the flow rate sensor 210.

[0026]

[Example 1] Clothing cleaning evaluation was performed using the silver ion water produced by electrolyzing based on the example of drawing 1 and drawing 2. construction specification [ of the creation cell of silver ion water ]: -- electrode material . Silver Size of an electrode 2cmx2cm Electrode spacing 10mm electrolytic condition: Electrolytic voltage 13V electrolytic current 0 mA - 3 mA Flow : Flow used for per minute 10L1 washing 50L silver-ion concentration of the silver ion obtained: 0-200 ppb[0027] Cleaning condition clothing was put into drawing 1 and the washing machine based on the example of drawing 2, and

the following washing processes were repeated 100 times and performed.

Washing process Tap water 50L Washing time 10-minute  
dehydration process Drying time 3 minute rinse process 1  
tap-water 50L Washing time 5-minute dehydration process  
Drying time 3 minute rinse process 2 silver-ion water 50L  
Washing time 5-minute dehydration process Drying time 5-  
minute warm air desiccation 60 minutes [0028]The  
qualitative test (halo test) of the antibacterial test method  
(JIS L 1902) of valuation method textiles was followed. The  
result was judged by the existence of halo.

[0029]\*\* a result -- obtaining -- having had -- antimicrobial  
evaluation -- [drawing 3](#) -- being shown . [Drawing 3](#) showed  
the following things.

- Ag ion concentration is accepted for antibacterial  
properties in clothing at not less than 3 ppb, and propagation  
of the bacillus in a washing machine tub is suppressed.
- As a result of 100 wash cyclic tests, when set to not less  
than 50 ppb, the case where adhesion of a silver black  
sludge arose occurred but only.

[0030]In this example, silver ion water was rinsed, it was  
considered as the process 2, and the effect shown in [drawing 3](#)  
was acquired. The effect was not accepted even if it used  
silver ion water for the washing process. In this example, it  
completed at the rinse process 2 and adhesion of the black  
sludge shown in [drawing 3](#) was accepted. It was possible to  
have reduced generation of a black sludge, maintaining  
antibacterial properties, although some antibacterial  
performances fell when the rinse process by tap water was  
added after the rinse process 2.

[0031]The influence of a flow on the silver ion  
concentration generated by electrolysis based on Example 1  
is shown in [drawing 4](#). As shown in [drawing 4](#), even if it  
changes a flow in between 10L to 20L, silver concentration  
shows the stable value between 20 to 22 ppb.

[0032]The navigational panel of the example of this  
invention is shown based on [drawing 5](#). The switch which  
selects cleaning conditions [ navigational panel / 510 /  
which is all over the washing machine A ], such as an  
electric power switch and "saving course" "careful course"  
520, It consists of the "antibacterial water selection" switch  
550 which selects the existence of an antibacterial treatment,  
the lamp in which it is shown that it is under operation, an  
"antibacterial completion" display which shows that the  
antibacterial treatment is completed, and a "silver ion water"  
display which shows that silver ion water remains in a

washing machine.

[0033]As mentioned above, although the example of this invention was described, this invention is not limited to the above-mentioned example. For example, a silver ion water generating device may be arranged in the lower part of the wash container 103.

[0034]

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[Translation done.]

JAPANESE

[JP,2001-276484,A]

Drawing selection **Representative draw**

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DRAWINGS DRAWINGS

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**DESCRIPTION OF DRAWINGS**

[Brief Description of the Drawings]

[Drawing 1] It is a lineblock diagram of the washing machine concerning the example of this invention.

[Drawing 2] It is a lineblock diagram of the silver ion water generating device with which the washing machine concerning the example of this invention is provided.

[Drawing 3] It is an evaluation result of silver ion concentration and antibacterial performance concerning the example of this invention.

[Drawing 4] It is influence on the flow of the cell concerning the example of this invention.

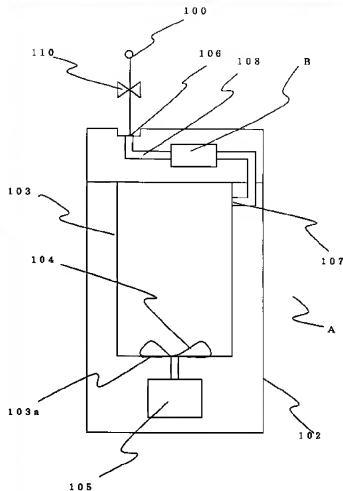
[Drawing 5] It is a figure of a control section and an indicator concerning the example of this invention.

[Description of Notations]

A -- Washing station

B -- Silver ion water generating device

100 -- Cock of a water supply system



[Translation done.]

110 -- Relief valve  
103 -- Wash container  
240 -- Control unit  
106 -- Inlet  
210 -- Flow rate sensor  
290a -- Water flowing pipe 290a

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[Translation done.]

JAPANESE

[JP,2001-276484,A]

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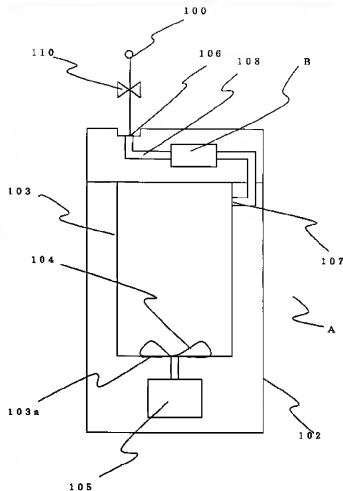
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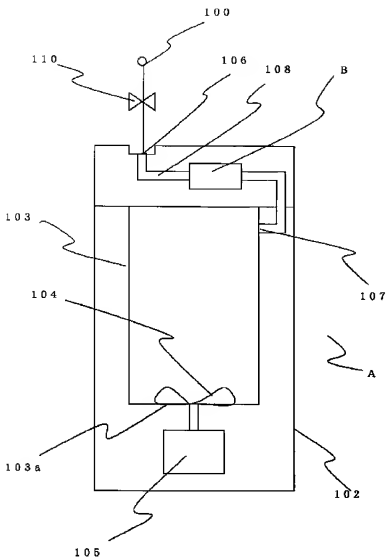
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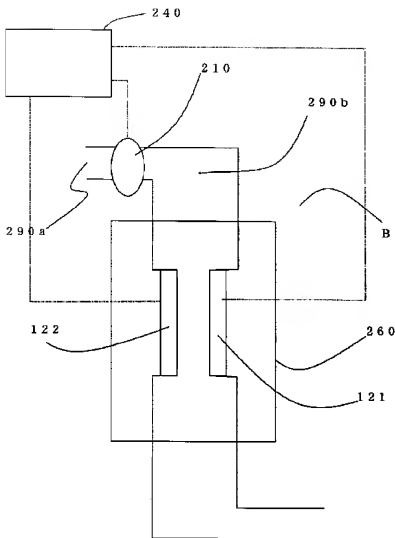
## DRAWINGS

[Drawing 1]Drawing selection Representative draw

[Translation done.]



[Drawing 2]



[Drawing 3]

銀イオン濃度	抗菌性能 ハローの幅 (mm)	100回洗浄後 の目視検査結果	判定
0ppb (無添加)	0	異常なし	×
1ppb	0	異常なし	×
3ppb	2	異常なし	○
10ppb	4	異常なし	○
20ppb	5	異常なし	○
50ppb	7	異常なし	○
100ppb	11	黒色析出が見られる場合があった	△

ハローの幅:  $(X - Y) / 2$

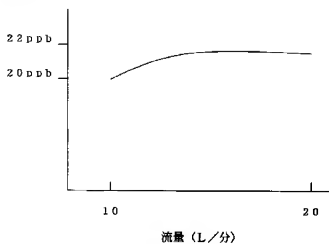
X : 試験片とハローの長さの合計 (mm)

Y : 試験片の長さ (mm)

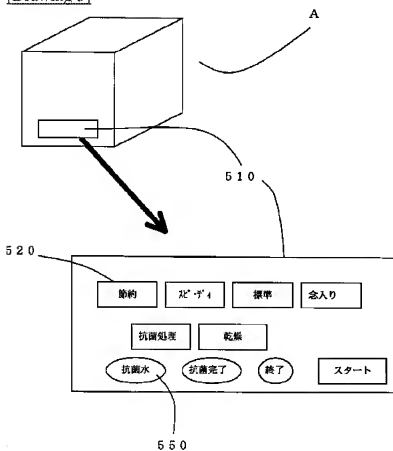
[Drawing 4]



銀イオン濃度  
(ppb)



[Drawing 5]



[Translation done.]